UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/771,152	02/04/2004	Ravi B. Gopal	9351-382	9104

1059 7590 05/09/2006

BERESKIN AND PARR
40 KING STREET WEST
BOX 401
TORONTO, ON M5H 3Y2
CANADA

EXAMINER	
BERHANU, SAMUEL	
ART UNIT	PAPER NUMBER
2838	

DATE MAILED: 05/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/771,152	GOPAL, RAVI B.	
	Examiner	Art Unit	
	Samuel Berhanu	2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 November 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13,15 and 17-25* is/are pending in the application.

4a) Of the above claim(s) *14* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-13 and 15, 17-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 November 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5, 7, 15, 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freeman et al. (US 6,519,539) in view of Werth et al. (US 4,931,947).

Regarding Claims 1 and 17, Freeman et al. disclose in Figure 1,an electrochemical system comprising a plurality of cells (90, Column 5, lines 31-32); a measuring device (120,130) including a plurality of inputs connected across the plurality of cells to generate voltage and current signals indicative of voltage and current characteristics of the plurality of cells (Column 5, lines 52-56); a current supply/draw means (100) for superimposing modulated current values through the plurality of cells (Column 5, lines 47-51, Column 3, lines 65-67, Column 4, lines 38-32) and, a controller (10, 20) for controlling at least one system operating condition based on the voltage and current characteristics received from the measuring device, the controller being connected to the measuring device (Column 5, lines 45-47), wherein the at least one system operation condition comprises at least one of temperature, humidity, and reactant flow rates, within the electrochemical system (Column 4, lines 43-61,

Column 6, lines 35-65). Freeman et al. do not disclose explicitly, a load powered by the plurality of cells and the load is connected to the plurality of cells in parallel with the current supply/draw means. However, Werth et al. disclose in Figure 1, load (16) powered by the plurality of cells (10) and the load is connected to the plurality of cells in parallel with the current supply/draw means (Column 4, lines 16-20, noted also that the electrical circuit or wire which served as a connection means for the fuel cell and the load can be considered as a current supply means for the load device since it provides operating power to the load). It would have been obvious to a person having ordinary skill in the art at the time of the invention to connect a load in parallel with the fuel cell as taught by Werth et al. in Freeman et. al. apparatus in order to power a load with a fuel cell along with another alternative energy source to meet the load demand in a most efficient manner.

Regarding Claim 2, Freeman et al. disclose in Figure 1,the current supply/draw means comprises a modulator (50, Column 5, lines 52-56).

Regarding Claim 3, Freeman et al. disclose, the modulator is an integral part of the controller (Column 5, lines 52-56).

Regarding Claim 4, Freeman et al. disclose in Figures 1, the plurality of inputs are connected across individual cells in the plurality of cells and the modulator is operable to superimpose modulated current values through the individual cells (Column 5, lines 40-56).

Regarding Claim 5, Freeman et al. disclose in Figure 1, the controller is operable to control, in real time, the at least one system operating

condition based on the voltage and current characteristics received from the measuring device (Column 6, lines 46-56))

Regarding Claims 7 and 19, Freeman et al. disclose the modulator is arranged to superimpose the modulated current values in burst time periods for high frequency resistance measurement, with time periods between burst time periods of no superimposition of modulated current values (Column 6, lines 1-33).

Regarding Claim 15, Freeman et al. disclose in Figure 1, wherein the controller includes an input (60), connectable to a computing device (20) for supply of control signals for controlling the controller.

Regarding Claim 18, Freeman et al. disclose a method (a) comprises superimposing the modulated current values across individual cells in the plurality of cells; and step (b) comprises drawing current from the individual cells to generate voltage and current signals indicative of voltage and current characteristics of the individual cells (Column 2, lines 31-56)

Regarding Claim 20, Freeman et al. disclose wherein step (a) comprises controlling the superimposing to provide a series of set interference conditions, and measuring, for each interference condition, at least some of the voltage and current characteristics of the electrochemical device (Column 6, lines 46-65).

Regarding Claim 21, Freeman et al. disclose, a method wherein step (a) comprises varying a frequency of the superimposed current values; step (b) comprises generating the voltage and current signals at selected frequencies

for the superimposed modulated current values, and determining from the voltage and current signals a plurality of real and imaginary components of the impedance of the individual cells; and, step (c) comprises controlling the at least one system operating condition based on the plurality of real and imaginary components of the impedance of the individual cells (Column 3, lines 57-67, Column 4, lines 1-39).

3. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Freeman et al. in view of Werth et al. (US 4,931,947) al as applied to claim 2 above, and further in view of Dunn et al (US 6,239,579).

Regarding Claim 6, neither Freeman et al. nor Werth et al. disclose the controller is operable to alert an operator based on alarm conditions determined from the voltage and current characteristics received from the measuring device. However, Dunn et al. disclose a controller is operable to alert an operator based on alarm conditions determined from the voltage and current characteristics received from the measuring device (Column 7, lines 18). It would have been obvious to a person having ordinary skill in the art at the time of the invention to modify Freeman et al device and add a monitoring circuit as taught by Dunn et al. in order to effectively monitor battery status.

4. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freeman et al. in view of Werth et al. (US 4,931,947) al as applied to claim 2, and further in view of Stader et al. (US 4,916,734).

Regarding Claim 8, Freeman et al. disclose in Figure 1, the measuring device provides a plurality of primary channels (120,130) for the measured

voltage (120) and current signals (130), there being one channel for the voltage across each cell. However, neither Freeman et al. nor Werth et. al. disclose the measuring device includes a splitter for separating out at least the DC components of the voltages across the individual cells from the primary channels, the splitter having first channels as outputs for the DC components Stader et a. disclose in Figures 1 and 2, the measuring device includes a splitter for separating out at least the DC components of the voltages across the individual cells from the primary channels, the splitter having first channels as outputs for the DC (Column 2, lines 19-68). It would have been obvious to a person having ordinary skill in the art at the time of the invention to add an AC and DC current separating means circuit as taught by Stader et al. in order to measure only the desired signal of interest.

Regarding Claim 9, Freeman et al. disclose in Figure 1, wherein the splitter includes second channels (130) as outputs for the AC components of the voltages across the individual cells.

5. Claims 10-13 and 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over unpatentable over Freeman et al. in view of Werth et al. (US 4,931,947) and in view of Stader et al. as applied to claim 8 above, and further in view of Bisher (US 5,416,416).

Regarding Claims 10 and 23, Freeman et al., Werth et al. and Stader et al. don't disclose explicitly, an analog multiplexer connected to at least the first channels from the channel splitter, wherein a multiplexer control line is connected between the controller and the analog multiplexer for controlling the

analog multiplexer to switch sequentially between at least the first channels. However, Bisher discloses in Figure 9 an analog multiplexer (357) connected to at least the first channels from the channel splitter, wherein a multiplexer control line is connected between the controller and the analog multiplexer for controlling the analog multiplexer to switch sequentially between at least the first channels. It would have been obvious to a person having ordinary skill in the art at the time of the invention to add a multiplexer in Freeman et al. device as taught by Bisher in order to obtain the desired signal of interest.

Regarding Claim 11, Freeman et al. disclose, a first analog to digital converter (70) connected to the output of the analog multiplexer, a voltage data bus (60, ch1) connected between the first analog to digital converter and the controller and an analog to digital control line connected between the controller and the first analog to digital converter for control thereof (Column 5, lines 57-67)

Regarding Claim 12, Freeman et al. disclose, a current sensing device (110) is provided connected in series with the individual cells for measuring the current, wherein the current sensing device is connected to the controller (130).

Regarding Claim 13, Freeman et al. disclose, the current sensing device (110) are connected to a current amplifier (130) and wherein the current amplifier has an output for a current measurement signal connected to the controller (ch2).

Regarding Claim 22, Freeman et al. disclose, wherein step (b) comprises connecting inputs of a plurality of differential amplifiers across individual cells of

the electrochemical device, measuring the voltage and current of the cells with the plurality of differential amplifiers to generate the voltage and current signals. Freeman et. al. do not disclose explicitly, supplying the voltage and current signals to a multiplexer and operating the multiplexer to sequentially supply the voltage and current signals to a controller for performing step (c). Bisher discloses supplying the voltage and current signals to a multiplexer and operating the multiplexer to sequentially supply the voltage and current signals to a controller for performing step (c) (see claims 10 and 23 rejection above).

Regarding Claim 24, Freeman et al. disclose, providing a current sensing device (130) connected in series with the cells for measuring the current through the load, measuring the voltage across the current sensing device to determine the current through the Load and thereby generating a current measurement signal, and supplying the current measurement signal to the controller (ch2).

Regarding Claim 25, Freeman et al. disclose, converting the current measurement signal to a digital current measurement signal, and supplying the digital current measurement signal to the controller (Column 4, lines 57-67).

Response to Arguments

6. Applicant's arguments with respect to claim03/10/2006 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel Berhanu whose telephone number is 571-272-8430. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Karl Easthom can be reached on 571-272-1989. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SB

KARL EASTHOM
SUPERVISORY PATENT EXAMINER